Practice Aptitude QUIZ

Spatial Information Services & Surveying

Part 1: About this Spatial Information Service & Surveying Resource

Guidance

The Practice Aptitude Quiz is intended to be a general illustration of some of the key learning standards required of people attempting an Australian Apprenticeships entry level qualification in the Spatial Information Services and Surveying Industry.

This Practice Aptitude Quiz is neither a formal tool nor a direct pre-requisite for any job application.

This quiz has been developed with the assistance of industry, TAFE and the secondary school sector as a careers resource.

The quiz focuses on literacy, numeracy, comprehension and problem-solving questions contextualised to this specific industry.

The quiz can be utilised by numerous organisations and people such as careers practitioners working with young people, Group Training Organisations and Job Services Australia providers working with job seekers.

The Practice Aptitude Quiz can be:

- Used by careers practitioners with individuals or in a class setting to provide general guidance on the level of study involved in undertaking an entry level qualification in this industry;
- Provided to people to enable them to practice their skills before sitting an actual aptitude test;
- Used by Mathematics teachers as a guide to industry maths requirements at the entry point of this particular Australian Apprenticeship;
- Used by teachers as classroom based activities for students in Year 12.

The level of reading, writing and mathematical skills assessed by this quiz is equivalent to that of a typical young person at Year 12 level.

Please note that rates quoted in this assessment for various items, including pay rates, are not meant to reflect today's values, but are used purely for mathematical purposes.
The quiz should be able to be completed in approximately 90 minutes.
Calculators may be used to complete parts of this practice exercise.
Answers are located at the end of the quiz.

Occupational Information and Job Hunting Resources

Information and links on the Spatial Information Services and Surveying Industry, careers, job prospects as well as career websites and job hunting resources can be found at www.aapathways.com.au/Career-Resources.

After the Quiz

There are a range of support services available to help you find out about courses that may help you improve your literacy and numeracy skills and also your readiness for work.

If you are still at school you should discuss any concerns you may have with your career practitioner. Further information may also be provided by an employment service provider, an Australian Apprenticeships Support Network (Apprenticeship Network) provider, a Group Training Organisation or a training provider.

Useful Contacts

Here are some links to job seeker support services:

- Search for your local Australian Apprenticeships Support Network (Apprenticeship Network) provider - www.aapathways.com.au/sps

- Find a local Group Training Organisation - www.grouptraining.com.au/Find/find_gto.html

- Employment service providers work with eligible job seekers to develop an individually tailored plan. The plan maps out the training, work experience and additional assistance needed to find job seekers sustainable employment - https://jobsearch.gov.au/

Part 2: The Quiz

Section 1 - Literacy, Reading and Comprehension

Spelling

1. **Each sentence has one word which is incorrect. Write the correct spelling of the word.**

    a. I have seperate instruments for each of you.   _____

    b. That is absolutely unbelieveible.   _____

    c. The accomodation for the survey party was unsuitable so they left.   _____

Grammar

2. **Which of the following correctly completes these sentences? Circle the correct response(s) from the list of four options given for each sentence.**

    a. Joni was positive she was outside when she _____ the gun go off.

        had heard   heard   will hear   hears

    b. We were concerned when we saw _____ person it was who had been evacuated

        when   who   what   which

    c. Vuong discovered that the plans could be drawn _____on a computer

        more easy   really easy   more easily   easy

    d. The survey team will be leaving their office on Sunday as _____spending two days working in Alice Springs. On Wednesday morning, _____ are due back in Adelaide.

        their   they   there   they're

4

Punctuation

3. **Which sentence has the correct punctuation?** *(Circle the correct response)*

    a. i.   Tessa asked, 'Where are you going Jamie?'

    ii. Tessa asked. 'Where are you going Jamie?'

    iii. Tessa asked 'Where are you going Jamie?'

    iv. Tessa asked 'Where are you going Jamie'

    b. i.   Last August, was the coldest month ever recorded?

    ii. Last August was the coldest month, ever recorded.

    iii. Last August was the coldest month ever recorded.

    iv. Last August, was the coldest month ever recorded.

4. **Which sentence is correct***? (Circle the correct response)*

    a. i.   The papers you gave to me have been filed in the storeroom.

    ii. The papers you give to me have been filed in the storeroom.

    iii. The papers you gaved to me have been files in the storeroom.

    iv. The papers you gived to me have been files in the storeroom.

    b. i.   The really long train moved quickly as it rounded the bends.

    ii. The real long train moved quickly as it rounded the bends.

    iii. The really long train moved quick as it rounded the bends.

    iv. The real long train moved quick as it rounded the bends.

Comprehension

5. Read the following article about Spatial Information Services and Surveying occupations and answer the questions that follow.

Do you know where your backyard ends and your next-door neighbour's yard begins? Do you know the size of the block of land that your house is on? These are questions that can be answered by Surveyors.

Surveyors primarily determine position on the earth's surface by undertaking measurements and from these measurements produce drawings of what the earth's surface looks like.

Surveying involves several types of workers:

- Cadastral or licensed Surveyors measure land. They describe where a certain area of land is. They explain what it looks like, and how much is there. They are responsible for locating the exact corners of blocks of land when land is being sold or developed for houses. They put these facts in documents such as deeds, leases, and other legal documents.
- Geodetic Surveyors measure large areas of the earth's surface where it is necessary to take the curvature of the earth into account.
- Engineering Surveyors determine where buildings, roads, railways and bridges are to be located. They are responsible for determining what the ground looks like for the area of a project, and are then responsible for positioning the features for the project (buildings, roads etc).
- Mining Surveyors determine the layout of a mine site. They are responsible for where everything on a mine site is positioned, as well as determining where resources such as ore is to be mined. At the end of each month they determine how much of the resource has been removed.
- Marine or Hydrographic Surveyors survey harbours and rivers, and locate and position drilling rigs and undersea communication cables and pipelines.

Surveyors also study legal records. They look for previous property boundaries. They record the results of the survey. They make sure that their spatial data is correct. Afterwards, they draw plans to show what the area looks like and then write reports. Surveyors who set up boundaries must be licensed by the State or Territory in which they work.

Another type of worker is a Survey Technician. Survey Technicians help Surveyors when they go to a site. They might assist the Surveyor with measuring distances and angles, with measuring tapes or electronic distance measuring equipment. Survey Technicians write field notes, as well as make sketches and enter information into computers.

Some survey parties include Survey Assistants. They assist the Surveyor and the Survey Technicians by holding a prism or a staff, driving vehicles, and maintaining the equipment. They also assist by setting up equipment, placing stakes and pegs in the ground, and carrying equipment.

How can you get to a specific location? What does the land in another part of the country look like? How are maps created? These are questions answered by Cartographers, another occupation in the Spatial Information Services and Surveying field.

Cartographers undertake the tasks of designing, compiling, drafting and reproducing maps. They use information collected from aerial photographs and the data collected by Surveyors to select the information required for the map. Cartographers produce maps for a wide range of purposes, from town planning and mining, to road maps and topographical maps.

Most maps are produced using specialised computer software. Cartographers require good computing skills to master this software.

Specialist Cartographers, called Photogrammetrists, use computer software to interpret the information from aerial photographs so that it can be used on maps.

Most Cartographers are employed by government organisations and large Spatial Information Services companies.

Do you know how much wheat will be produced in this year's harvest? Do you know how far flood waters could possibly extend? These are questions that can be answered by another occupation in the Spatial Information Services field, the Geographical Information Services (GIS) Technician.

Geographical Information Services (GIS) Technicians use imagery from satellites and aerial photography to interpret what is happening on the earth's surface. They analyse, manipulate, retrieve and store spatial data.

GIS Technicians don't necessarily make maps, but rather they use spatial data and specialist software to help people, organisations and governments to make decisions.

About Conditions of Work

Most people employed in the Spatial Information Services and Surveying Industry usually work an 8-hour day, 5 days a week, although Mine Surveyors often work 12-hour days for 8-9 days and then have 5-6 days off.

Surveyors often spend a lot of their time outdoors, sometimes in remote areas. They can work longer hours during the summer when the weather is good and the sun stays up longer, whereas Cartographers and GIS Technicians spend almost all their time in offices working on computers.

Land Surveyors and Technicians often stand for long periods. They have to climb hills and walk long distances. Sometimes they have to stay out overnight. They carry heavy packs of instruments and equipment. They face all types of weather when they are working outdoors.

Surveyors also spend a lot of time in their office, where they will work on a computer. While in the office, they have to download the data that they have collected in the field into a computer so that they can make plans.

They will design the layout of features for projects, and then download the coordinates for these features into their surveying instruments for when they go back out into the field. While in the office they will review what they have collected in the field, and prepare reports and plans. Most of the time, surveyors use computers to do mathematical problems and draw plans.

a. For what type of documents do Cadastral Surveyors provide facts?

b. What types of tasks does a Survey Technician perform?

c. What is the difference between a Cartographer and a Hydrographic Surveyor?

d. Who can help answer the question of how good a crop will be?

e. List five features of the working conditions of a Land Surveyor.

6. **Risk Minimisation Controls**

   The following are common controls or ways in which to minimise workplace injury. Match the controls with the hazards. Write your answers in the third column of the table on the following page.

   Note: There may be multiple controls for each hazard.

   <u>Controls</u>

i. Hat	vi. Manual handling guidelines
ii. Sunscreen	vii Safety cones
iii. Long sleeved shirt	viii. Reflective vest
iv. Work in groups or pairs	ix. Follow pedestrian road safety procedures
v. Protective boots	

	Hazards	Risk	Risk Minimisation Controls
a.	Road traffic	Injury	
b.	Sun exposure/weather	Sunburn	
c.	Manual handling	Injury	
d.	Crossing roads	Injury	
e.	Drop object	Foot injury	

Section 2 - Mathematics

Part A – Without a calculator. Show all working out.

Arithmetic

1. **Add the following.**
   a. 841.59 + 27.50 + 653.23 + 327.99 _____
   b. 453.538 - 374.859 _____

2. **Multiply the following.**

   a. 453 x 4 _____

   b. 638.3 x 6 _____

3. **Divide the following.**

   a. 741 ÷ 3 _____

   b. 407.0 ÷ 4 _____

Algebra

4. **Manipulate the following equations to make Y the subject.**
   a. $D + H – J + T = U – Y + R$ = _____
   b. $H + (R – 3) = K – Y$ = _____
   c. $Y (E + 7) = (T – E)$ = _____

Geometry

5. **What is the name for each of these triangles?**

a.
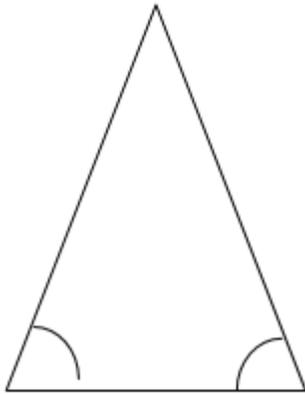
Where the two angles shown are equal:

_____

b.
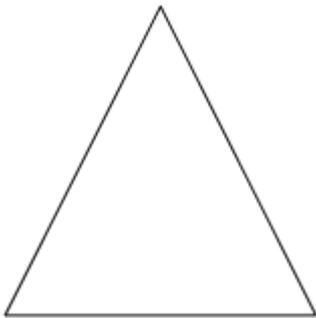
Where all three sides are equal:

_____

6. **A Surveyor working on a building site has to set out a line AB at right angles to the baseline BC. He decides to use Pythagoras' Theorem for this, so he measures side AB = 3 m and side BC = 4 m.** *What length must side AC be for angle B to be 90°?*
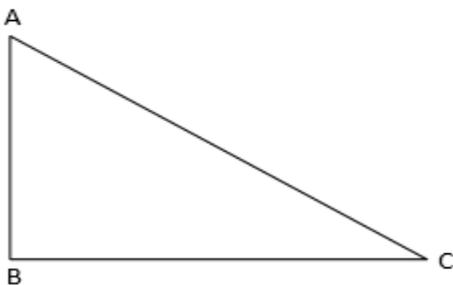
AB	=	3 m
BC	=	4 m
Angle B	=	90°

_____

7. A rectangular parcel of land measures 15 m x 20 m. What is the area of the parcel?
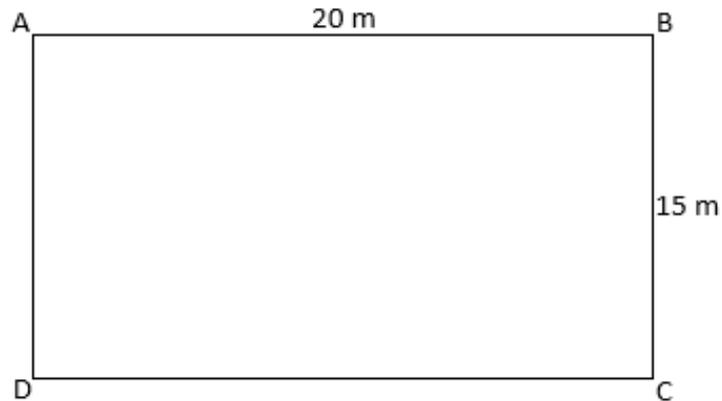
Area   = _____

8. Solve the following diagrams for the missing elements.

a.

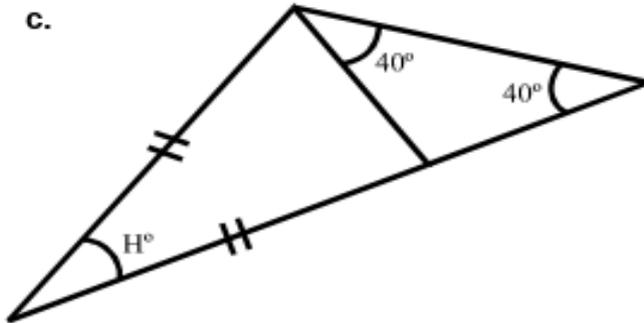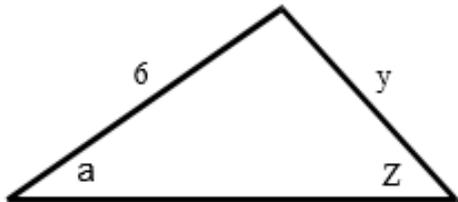P°   = _____

b.

C°   = _____

c.

H°   =   _____
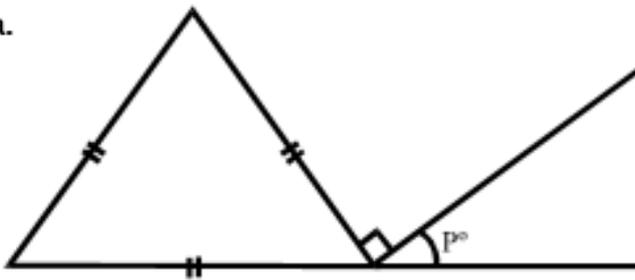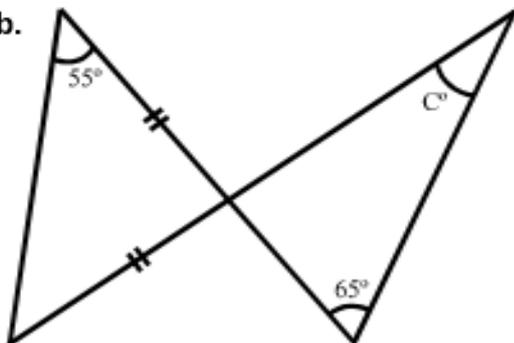
9. Calculate the length of side y given the two triangles.

y   =   _____
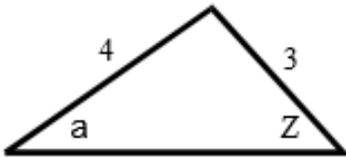
Trigonometry

10. In the right-angled triangle shown, which ratio correctly represents:
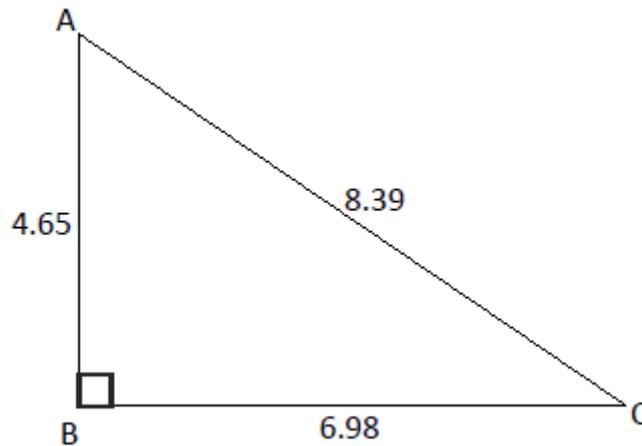
a. Tan A. (Circle the correct response)

i. $\dfrac{4.65}{8.39}$

ii. $\dfrac{8.39}{4.65}$

iii. $\dfrac{8.39}{6.98}$

iv. $\dfrac{6.98}{8.39}$

v. $\dfrac{4.65}{6.98}$

vi. $\dfrac{6.98}{4.65}$

b. Sin A. (Circle the correct response)

i. $\dfrac{4.65}{8.39}$

ii. $\dfrac{8.39}{4.65}$

iii. $\dfrac{8.39}{6.98}$

iv. $\dfrac{6.98}{8.39}$

v. $\dfrac{4.65}{6.98}$

vi. $\dfrac{6.98}{4.65}$

General Mathematics

11. What is three-quarters of 36? *(Circle the correct response)*

a. 20   b. 24   c. 27   d. 33

12. Two-thirds of a box of 24 survey pegs have been painted red. Another 2 pegs have been painted white. The remaining pegs have not been painted. What fraction of the pegs has not been painted? *(Circle the correct response)*

a. $\dfrac{1}{20}$ b. $\dfrac{1}{5}$ c. $\dfrac{1}{4}$ d. $\dfrac{3}{24}$

13. What is 4 - 1.07? *(Circle the correct response)*
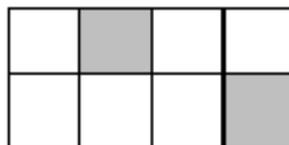
a. 0.75   b. 2.93   c. 3.93   d. 7.5

14. What is 4 - 0.3 x 0.4? *(Circle the correct response)*

a. 1.2   b. 2.2   c. 3.88   d. 14.8

15. What percentage is 18 of 24? *(Circle the correct response)*

a. 25%   b. 40%   c. 60%   d. 75%

16. What percentage of the rectangle remains unshaded? *(Circle the correct response)*

a. 75%   b. 80%   c. 25%   d. 20%

Part B – Use a calculator for this section

Algebra

1. **In the formula** $Cos\theta = \dfrac{a}{h}$ **if θ = 26.4723° and a = 21.709. Calculate h.**

    h   =   _____

2. **Given that the volume of a cylinder V = pr2h and p = 3.141, r = 5.6, h = 7.2, calculate the volume v.**

    V   =   _____

3. **Calculate R given** $R = \dfrac{A^2 + B^2 + C^2}{2AB}$ **that A = 24, B = 20, C = 18**
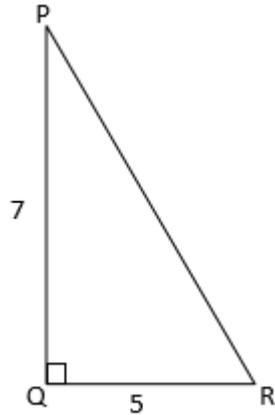
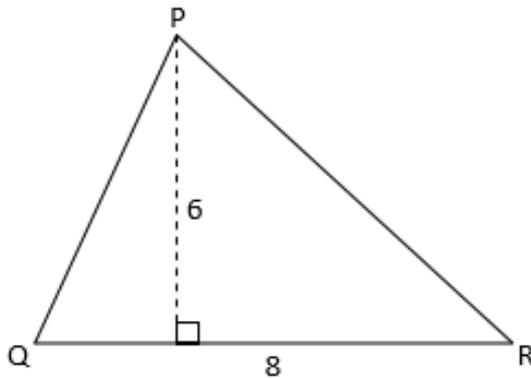   R   =   _____

Geometry

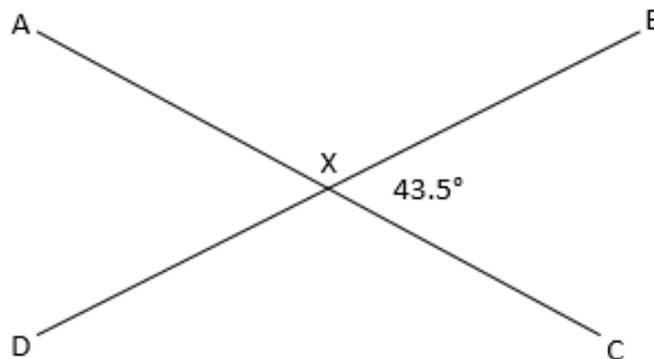4. **Calculate the area of the triangle PQR**

a.

b.

5. **Calculate angles AXB and DXA**

AXB   =   _____

DXA   =   _____

Trigonometry
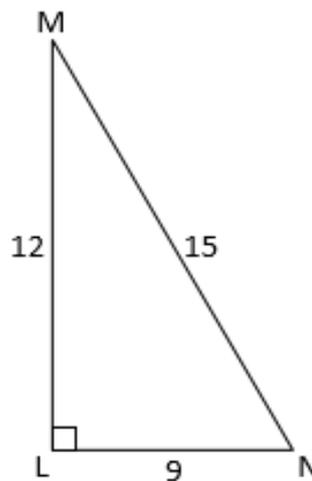
6. **In the right-angled triangle, calculate the length FH.**
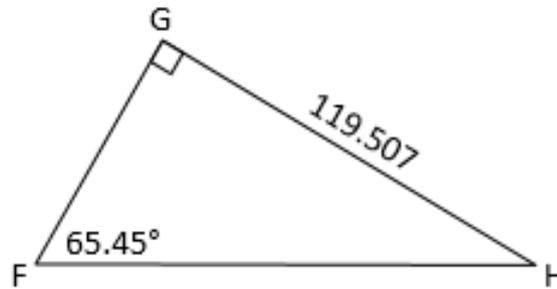
    FH   =   _____

7. **Calculate the value of the angles M and N.**

    M   =   _____

    N   =   _____

8. **Calculate the value for each of the following (to 4 decimal places):**

    a.   Cos 65°   =   _____

    b.   Sin 236°   =   _____

    c.   Tan 153.763°   =   _____

9. **Determine the angle for each of the following values (to 1 decimal place):**

    a. $\text{Cos}^{-1}\,0.456324$ =   _____

    b. $\text{Sin}^{-1}\,-0.32571$ =   _____

    c. $\text{Tan}^{-1}\,4.3279$ =   _____

General Mathematics

10. **Calculate the following** *(to 1 decimal place)***:**

    a. 34^2 _____

    b. $\sqrt{0.56}$ _____

Problem Solving

11. **Helen is a Surveyor who is required to determine the volume of a parallel sided drain, measuring 10m long, 2 m wide and 1 m high.** *What was the volume she calculated, in cubic metres?*

    _____ m^3

12. **To assist with airport fight path planning, Anita has been asked to determine how far away from the end of the runway a plane will be if the plane is flying at 1500 m higher than the airport and approaching the airport at an angle of 5°.** *Calculate the distance from the end of the runway.*

    _____ m

13. **As a technician working on a redevelopment project Gregor needs to determine how many bricks are required to pave an area in front of a property, 21.6m long, between a road and a footpath 7.5m apart. Each brick measures 200 mm by 100 mm and is to be laid with the long side parallel to the road.** *Calculate the number of bricks required.*

    _____ bricks

Answers

Section 1 - Literacy, Reading and Comprehension

1.   a. separate   b. unbelievable   c. accommodation

2.   a. heard   b. which   c. more easily   d. they're; they

3.   a. i. Tessa asked, "Where are you going Jamie?"

      b. iii. Last August was the coldest month ever recorded.

4.   a. i. The paper you gave to me has been filed in the storeroom.

      b. i. The really long train moved quickly as it rounded the bends.

5.

      a.   Deeds, leases, and other legal documents.

      b.   Survey Technicians assist the Surveyor to measure distances and angles. They write field
           notes and make sketches.

      c.   Cartographers collect facts about the earth's surface, prepare maps of large areas.
           Hydrographic Surveyors study harbours, rivers, and other bodies of water.

      d.   A GIS Technician.

      e.   Stand, walk long distances, climb hills, stay overnight, carry heavy packs, experience all types
           of weather.

6.   a. vii, viii   b. i, ii, iii   c. iv, v, vi   d. viii, ix   e. vi

Section 2 – Mathematical and problem-solving questions
Part A – Without a calculator

1.   a. 1850.31   b. 78.679
2.   a. 1812   b. 3829.8
3.   a. 247   b. 101.75
4.   a. $Y = U + R - D - H + J - T$
      b. $Y = K - H - (R - 3)$
      c.
      $$Y = \frac{(T - E)}{(E + 7)}$$

5.   a. Isosceles triangle   b. Equilateral triangle
6.   5m
7.   300 m2
8.   a. P = 30°   b. C = 45°   c. H = 20°
9.   d. 4.5
10.   a. vi b. iv
11.   c. 27
12.   c. $\frac{1}{4}$

13. b. 2.93

14. c. 3.88

15. d. 75%

16. a. 75%

Part B – With a Calculator

1. h = 24.252

2. V = 709.213

3. R = 0.679

4. a. 17.5   b. 24

5. AXB = 136.5° and DXA = 43.5°

6. 131.384

7. N = 53.13°   M = 36.87°

8. a. 0.4226   b. - 0.8290   c. - 0.4929

9. a. 62.8°   b. -19.0° or 341°   c. 77 .0°

10. a. 1156.0 b. 0.7

11. 20 m3

12. 17,145 m

13. 8,100 bricks

This Practice Aptitude Quiz was developed by

Australian Apprenticeships and Traineeship Information Service, which delivers the Australian Apprenticeship Pathways website, MyGain (YouTube channel) and AusAppPathways – Mobile App. The service provides sample Australian Apprenticeships job descriptions and links to more Australian Apprenticeships information and resources. The service is funded by the Australian Government, Department of Education and Training.

The Australian Centre for Career Education - www.ceav.vic.edu.au

The Australian Centre for Career Education is a state based peak association for career practitioners working in a range of educational settings. The ACCE provides membership, training and professional development aligned to the national standards for career practitioners. It also provides careers counselling to the general public and consultancy to industry and governments.

**For enquiries about this Practice Aptitude Quiz, contact
The Australian Apprenticeships and Traineeships Information Service on
1800 338 022**